A framework for

Coastal & Estuarine Resource Condition Assessment

Sharing resources and knowledge for better management

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Executive Summary

The development of a standardised means of collecting, analysing and presenting coastal and estuarine condition information has been identified as a key need for southern Tasmania. NRM South, in partnership with the Tasmanian Aquaculture and Fisheries Institute (TAFI), has developed a Coastal and Estuarine Resource Condition Assessment (CERCA) framework for the Southern NRM Region of Tasmania.

The framework aims to improve the value and availability of coastal and estuarine water quality information. This will overcome the lack of data, and the limited exchange of information that currently exists.

The framework brings together a range of stakeholders – some of whom collect water quality data – who will all benefit from increased data accessibility and standard collection, collation and distribution methods.

The development of this project involved the development of a communication strategy, a review of existing data, an evaluation of the key values and threats, and identification of priority monitoring sites. This was followed by the selection of monitoring methods and an evaluation of stakeholder capacity to assist in the project implementation. Subsequently a number of partnerships were developed between the project and stakeholders, including community groups, local governments, industry bodies and state agencies. These partnerships have enhanced the capacity to collect, analyse and present water quality data.

A successful trial of the CERCA program has resulted in a number of significant outputs, including the determination of baselines for a number of indicators of environmental health, which in turn have allowed for the identification of preliminary trigger levels. These preliminary trigger levels can be used to determine the condition of estuaries and coastal waters, assist in planning and management decision-making, and act as alerts for further investigation. The trial has demonstrated the critical need for local data when establishing such benchmarks.

Data obtained from the trial have been placed in a centralised database that is widely accessible. These data have then been interpreted in a range of formats to suit the needs of individual stakeholders.

The overall outcome is better management of Tasmania's water resources by having a standardised (and trialled) monitoring program for water quality, a single database that is readily accessible to all stakeholders, and an effective reporting mechanism to communicate water quality and resource condition information to stakeholders and managers.

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Acronyms and Abbreviations

ANZECC	Australian and New Zealand Environment Conservation Council
AusRivAS	Australian River Assessment System
CERCA	Coastal and Estuarine Resource Condition Assessment
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEP	Derwent Estuary Program
DHHS	Department of Health and Human Services
DPIWE	Department of Primary Industries, Water and Environment
DPIW	Department of Primary Industries and Water
DEPHA	Department of Environment, Parks, Heritage and the Arts
MoU	Memorandum of Understanding
NHT	Natural Heritage Trust
NLWRA	National Land & Water Resources Audit
NRM	Natural Resource Management
PCSC	Port Cygnet Sailing Club
PEVs	Protected Environmental Values
PWS	Parks and Wildlife Service, Tasmania
QA/QC	Quality Assurance/Quality Control
Ramsar	Convention on Wetlands, signed in Ramsar, Iran, in 1971
SCAT	Southern Coastcare Association of Tasmania Inc.
STP	Sewage Treatment Plants
TAFI	Tasmanian Aquaculture and Fisheries Institute
TSGA	Tasmanian Salmon Growers Association
TSIC	Tasmanian Seafood Industry Council
TSQAP	Tasmanian Shellfish Quality Assurance Program
WIST	Water Information System, Tasmania
WQOs	Water Quality Objectives

Chapter One

Introduction To
Coastal & Estuarine Resource Condition Assessment

Why a CERCA Framework?

The development of a standardised means of collecting, analysing and presenting coastal and estuarine condition information has been identified as a key need for southern Tasmania (NRM South 2005). NRM South, in partnership with the Tasmanian Aquaculture and Fisheries Institute (TAFI), aims to fulfil this goal by developing a Coastal and Estuarine Resource Condition Assessment (CERCA) framework in the Southern NRM Region of Tasmania.

The CERCA framework aims to improve availability of water quality data and access to information, as well as identifying the data and information needs of stakeholders. The outputs of this framework will be of great value to a wide variety of agencies and organisations for whom coastal water quality is an important issue. This framework makes recommendations for a system to improve our knowledge of coastal and estuarine resource condition by: (a) facilitating the collection, collation and sharing of information, and (b) coordinating the collection of high-quality resource condition information, especially where this information is lacking, but there is stakeholder support.

Currently, the assessment of water quality condition in the Region is characterised by a lack of resources and coastal and estuarine monitoring in the Region, and poor coordination between organisations and stakeholders. The lack of a standard approach to monitoring and assessment is also an issue. Information (e.g. data and results) is not readily available, and it is not being communicated sufficiently to stakeholders or managers. The CERCA Framework aims to address these issues.

Outcomes and benefits

This project proposes a resource condition framework for southern Tasmania by developing a baseline assessment and ongoing monitoring and evaluation program for key estuaries and coastal waters. This CERCA Program has been developed through extensive consultation with State Government, Local Governments, industries and community groups, and by collating and assessing available information on water quality and condition of estuaries and coastal waters.

The CERCA Framework supports all stakeholders by:

- Providing more readily available information on coasts and estuaries – including issues and values, and resource condition information – to stakeholders, managers and the community
- Improving communication and partnerships with Local and State Governments and providing formal linkages with other partners
- Providing a network to support and improve coastal and estuarine management
- Supporting community and stakeholders wanting to participate in coastal and estuarine management in a valuable and targeted manner
- Providing access to a range of monitoring data and information on coastal and estuarine resource condition
- Improving understanding of resource condition and its relationship to management planning (e.g. on-ground works in the catchment)
- Enhancing information exchange
- Improving resource and cost-sharing opportunities
- Providing a centralised database for storing water quality information
- Improving quality and consistency of information available by implementing standard procedures for monitoring, assessment and reporting
- Providing data to help determine Water Quality Objectives.

The overall anticipated outcome, of which this project is a component, is better management of Tasmania's water resources by having a standardised (and trialled) monitoring program for water quality, a single database that is readily accessible to all stakeholders, and an effective reporting mechanism to communicate water quality and resource condition information to stakeholders and managers. The management of this program will require ongoing and extensive communication with State and Local Government, community groups, industry and other interested stakeholders. Sharing resources, knowledge and data is critical to the achievement of this outcome.

Project Outline: Developing a CERCA Framework

Step 1: CERCA Project Directions – Review and Discussion

A discussion paper was produced to summarise the available information on water quality in the catchments and marine and estuarine habitats of the Southern NRM Region, and to recommend priority locations at which to initiate and trial a CERCA Program. A number of factors were considered to determine priorities: (a) significance of the location, (b) practicality of monitoring, and (c) capacity for collaboration. These considerations are quite broad and may be conflicting, reflecting the wide range of issues and potential uses of estuaries and coastal waters in the Region.

1.1 Develop communication strategy

Key stakeholders were identified and a strategy developed to communicate specific information to these groups (this has been revised for the CERCA Framework, see Chapter 3).

A CERCA Review Panel was initiated to provide critical input to this project by providing advice and guidance for the development of an effective CERCA Framework in the Southern Region and promoting acceptance and knowledge of the project. It was important that the CERCA Review Panel was representative of the key water quality stakeholders.

The CERCA Project Directions discussion paper (Temby and Crawford 2007) was sent out to the CERCA Review Panel and to key stakeholders for comment. Written feedback, and feedback received through meetings with stakeholders during January-July 2007, was used to provide the basis for the development of the CERCA Framework and the recommendations made in this report.

1.2 Review existing data and information

Available literature on the status and health of coastal ecosystems (estuaries and coastal waters) in the Region was reviewed and collated, including the identification of existing monitoring efforts (Temby and Crawford 2007). This was essential to devising ways in which resource condition assessment and monitoring could be coordinated and expanded. This process also identified data deficiencies that may need to be overcome.

1.3 Evaluation of values and threats in key estuarine and coastal areas

Values and threats in key estuarine and coastal areas were evaluated in the CERCA Project Directions discussion paper to assist with the identification of priority locations for resource condition assessment (Temby and Crawford 2007). This process included consultation with stakeholders to identify gaps in knowledge and threats to water quality, and to gain further information on those attributes not evaluated by other programs.

Wherever possible, existing resource condition assessment efforts were integrated. However, there is limited background information and baseline data available to help determine environmental issues and trends in the NRM South coastal waters. The monitoring programs that do exist include ongoing monitoring of a limited number of environmental variables, and snapshots (one-off studies). The collation of information allowed gaps to be identified and provided the opportunity to suggest ways in which these gaps could be filled within the time and resource limits of the stakeholders.

1.4 Identification of priority locations for condition assessment

Evaluation of existing monitoring highlighted that at any one time it is unlikely that there will be sufficient resources to monitor all waters in the Region. It was therefore necessary to determine which estuaries and coastal waters are the priority for monitoring and are representative of the Region. The CERCA Project Directions discussion paper (Temby and Crawford 2007) identified potential estuaries/coastal waters for monitoring and condition assessment.

As well as considering stakeholder support and capacity, it was important that the selection of priority locations was perceived to be fair (i.e. spread across municipalities). To ensure that the program could be developed elsewhere if interest arises, methodologies have been developed that are transferable and applicable to other areas.

Step 2: The CERCA Program – A Trial

Rigorous field-testing involving potential partners has been essential in evaluating the success of the CERCA Framework. An assessment of all aspects of the data collection, analysis and presentation as well as the capacity of potential partners provides the basis for framework modification and training needs. The 12 month trial included collection and collation of baseline monitoring data, involving partners (see Chapter 2), using a centralised database for water quality, and reporting information to stakeholders (e.g. Report cards).

2.1 Selection of monitoring methods

In order to overcome data deficiencies, monitoring methods need to provide spatial and temporal consistency and be robust and credible. In other words, they must provide a valid, useful output, be capable of replication in time and space. Reliable information on the condition of coastal and estuarine resources is required to manage these systems effectively and to assess development (including onground/improvement work) proposals adequately.

Monitoring methods (see Chapter 3) have been selected using indicators developed and evaluated by the Tasmanian Coastal, Estuarine and Marine Indicators Working Group (Mount 2006), which are a sub-group of the National set of indicators. These indicators have been developed to assess the status and trends of Tasmanian estuarine and coastal resources. The methods for monitoring each indicator have been based on a report that provides information from a user's perspective on monitoring each indicator in Tasmania (Crawford 2006).

2.2 Evaluating stakeholder capacity

The CERCA Project Directions discussion paper (Temby and Crawford 2007) was sent out to the CERCA Review Panel and to key stakeholders for comment. Written and verbal feedback was received through meetings with stakeholders during January-July 2007. Stakeholder groups were also asked about their interests and concerns, and whether they would support a CERCA Framework in the future. Groups and agencies that indicated that they were interested in continuing a CERCA Program were asked to consider their capacity to be involved; from this experience a network of partnerships has been proposed to provide the basis for the framework in the future (see Chapter 2).

Step 3: Recommending a CERCA Framework

The aim of the CERCA Framework is to develop a system for standardised resource condition assessment for estuaries and coastal waters (including baseline monitoring and reporting). The requirements for baseline assessment and monitoring were determined in conjunction with stakeholders.

A schedule of activities was developed to implement recommendations, including information on who monitors, where and how they monitor, what parameters are monitored, the frequency of monitoring and length of time over which monitoring is to be conducted for each parameter.

A feedback mechanism has been recommended, where monitoring results will be made available to managers, the general community and other stakeholders to share project information (e.g. a report card). This mechanism allows results and interpretations to be presented to relevant stakeholders, managers and scientists in a form that promotes understanding and improved resource management.

3.1 Development of the implementation strategy

This CERCA Framework includes an implementation strategy to consider ongoing aspects such as program management (see Chapter 2). Partnerships are extremely important to this stage, as implementation requires cooperation between stakeholders. Stakeholders have been encouraged to take a more coordinated approach to working in partnerships. It is recommended that these partnerships be formalised with Memoranda of Understanding (MoU) in the future. Some of these have been developed as part of the CERCA Program Trial.

3.2 Establishment of an interactive database for water quality

A centralised database for water quality, which links with existing water quality information systems (i.e. Hydstra database with outputs through "WIST", see Chapter 2) has been developed.

3.3 Develop trigger levels and guidelines

The CERCA Program trial (2007-2008) and the continuation of a CERCA Program will enable trigger levels for coastal and estuarine water quality to be identified and recommended for adoption by managers. This information can then be used as a preliminary step towards the development of Water Quality Objectives (WQOs) by the Environment Division, DEPHA.

3.4 Stakeholder review

A draft of the CERCA Framework has been produced and the recommendations made will be reviewed by the CERCA Review Panel.

Chapter Two

Coastal & Estuarine Resource Condition Assessment Framework Components

Framework Overview

Aim

In order for the CERCA framework to function, the requirements and outputs need to be clearly defined and the roles and responsibilities of all participants need to be understood.

This framework underpins the provision of information on the condition of our coastal and estuarine resources – ultimately to provide managers with quality assured information that can be used to address the strategic management issues. This includes protecting the ecology of marine, estuarine and coastal systems, understanding current status and changes and understanding potential effects of development and use of the coastal zone.

Requirements of a CERCA Program

Quality Assured / Quality Controlled (QA/QC) data are required to assess coastal and estuarine resource condition. Since this information was not currently available for coastal and estuarine waters in the Region, a baseline monitoring program with standardised methodology, and a system for the collation of existing and ongoing data, needed to be established.

Support from local stakeholders is required to establish and support this program. However, local stakeholders also require support to manage the program and to interpret data.

To enable consistent reporting and interpretation of water quality information, the CERCA Program requires ongoing support from the State Government to quality code, enter and store data in their existing database and to provide access to this information through their readily available (online) Water Information System of Tasmania (WIST).

This chapter proposes a framework in which to address the aim and requirements of CERCA (summarised in Figure 1).

The Proposed CERCA Network

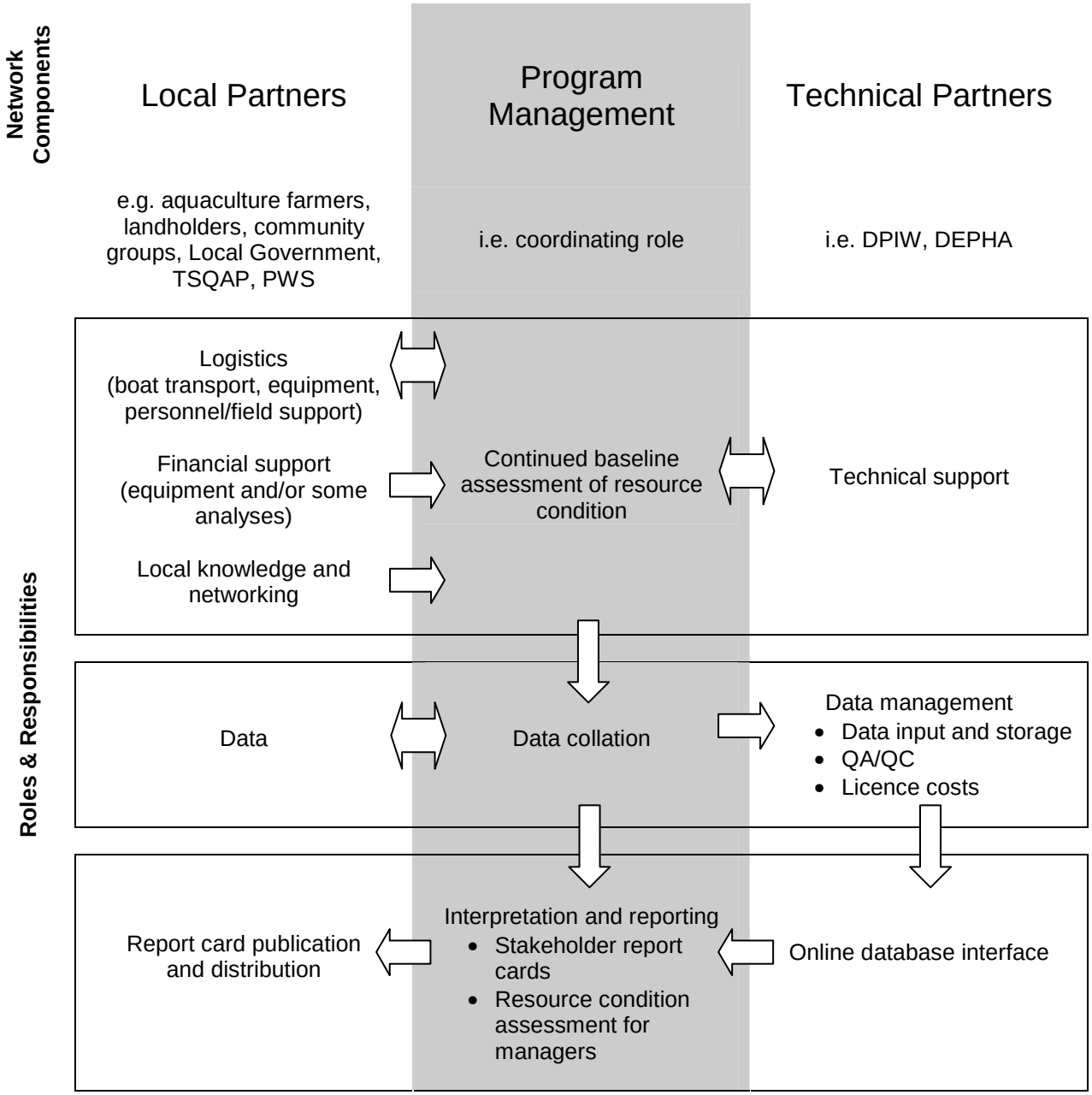


Figure 1. The Proposed CERCA Network

Stakeholder Input and Capacity

The recommendations made in the CERCA Framework have been carefully considered after comprehensive discussions with a wide range of stakeholders. Written and verbal feedback was received from the CERCA Review Panel and key stakeholders regarding the CERCA Project Directions discussion paper (Temby and Crawford 2007). Subsequently, stakeholder groups have been asked about their interests and concerns, and whether they would support a CERCA Framework in the future. Groups and agencies who indicated that they are interested in developing a CERCA Program were asked to consider their capacity to be involved. This information was used to propose a network of partnerships and to provide the basis for the framework in the future.

The main outputs that stakeholders expect in return for their commitment to the program include:

- Feedback in terms of an annual report card, with a target audience of the broad community, and a comprehensive 3-5 year review of coastal and estuarine resource condition for managers
- Management of the CERCA Program, including support for resource sharing, information sharing (and interpretation)
- Formal recognition for their role in the program.

Feedback is extremely important. Improving knowledge and awareness of issues among stakeholders is a positive step towards improved natural resource management. Although the CERCA Project Directions discussion paper was written with the main purpose of selecting priority locations for developing the framework, many stakeholders commented that it was a very comprehensive, informative and valuable resource in itself. They commented that the document provided them with a wealth of information on processes, values and monitoring efforts, both past and present, that they otherwise would not have had access to. These comments indicate the need for better knowledge on coastal and estuarine condition and better communication of this knowledge to stakeholders and managers.

Additionally, although stakeholders acknowledge their role as users and managers of specific estuaries/coastal waters, and therefore recognise they have a responsibility to contribute, they generally do not have the capacity to take on or fund a whole program. Despite limited capacity, key stakeholders have indicated that they can contribute to a partnership system with defined roles and they would be willing to develop MoUs in the future. This commitment, in most cases, was conditional on the availability of support (for managing the program and providing feedback on resource condition). The development of a CERCA Framework was seen to be extremely important and integral to the ability of stakeholders to commit/consider building capacity to participate. Statewide and/or Regional coordination needs to be recognised in order for partners to accept a CERCA Program. The long-term component is particularly important to Local Government, as Councils need to know that the program will be ongoing, and have long-term value and integrity regarding data quality and data management.

Management of the CERCA Program

NRM South, Local Governments, State Government agencies (e.g. Water Assessment (DPIW), the Environment Division (DEPHA), Parks and Wildlife (DEPHA), Recreational Health (DHHS), TSQAP (DHHS), the Australian Government (e.g. Caring for our Country) and various aquaculture (e.g. salmon and oyster) and agricultural industries, recognise that they have a responsibility to monitor and manage coastal and estuarine resource condition. However, no single group or agency has the capacity to implement and manage a resource condition assessment program on their own. This has meant that resource condition assessment has not taken place for most coastal and estuarine waters.

Partnerships for resource condition monitoring and assessment provide a mechanism for communication and allow stakeholders to take greater responsibility for management of coastal and estuarine ecosystems. Support from the NRM Regions, Local and State Government, industry and the community is fundamental to providing rigorous long-term ecological data and to improve management of coastal habitats and waterways at a local level (Zeller *et al.* 2001).

If supported, industry, government and community partnerships that monitor water quality can provide benefits, such as:

- better management
- increased community understanding of the connections between coastal, estuarine and catchment issues
- ability to detect change over time
- the creation of a focus for communities, industries and government to work together in managing the coastal zone sustainably.

Key project management objectives

The management of the CERCA Program will involve:

1. Managing standardised CERCA across Region (see Chapter 3 for details)
    a. Collect estuarine condition data from nominated sites according to the protocols and monitoring plan described in this framework
    b. Encourage, support and promote partnerships
    c. Maintain communication between managers (e.g. NRM South, Local Government, industry etc) and supply resource condition information
    d. Centralised data storage and management
    e. Provide critical estuarine condition information for the identification of NRM targets
    f. Link to programs in other Regions within the State

2. Maintaining linkages with State Government for data management (for CERCA collected data and data collated from other programs)
    a. Maintain standard Quality Assurance and Quality Control (QA/QC) protocols for water quality monitoring across the Region
    b. Interpret data in a meaningful way and provide feedback to stakeholders (e.g. report cards etc)

3. Continued development and implementation of the CERCA Framework
    a. Capacity building
    b. Expand program if there is stakeholder support to do so
    c. Develop new partnerships where feasible

d. Support the capacity of the community and stakeholders to participate in and/or contribute to the regional strategic estuarine condition monitoring program, and take action towards achieving on-ground NRM outcomes
e. Build stakeholder capacity to be involved by providing support, advice and/or training and equipment for stakeholder groups interested in water quality monitoring in the focus locations
f. Contribute towards updates of the Framework
g. Facilitate communication and cooperation between community interest groups, industries, local government, the NRM region and government agencies in relation to water quality issues
h. Continue to investigate potential funding sources and apply for funding
i. Provide high-level input into the development of Regional Investment Proposals

4. Supporting the identification and delivery of NRM objectives and outcomes by establishing a strategic CERCA Program in the Southern Region
    a. Improve stakeholder and community awareness and ownership of coastal and estuarine water quality issues
    b. Improve reporting on resource condition and management of estuaries and coastal waters

The resources required to achieve effective program management include the administrative costs for a Program Manager (i.e. salary, host administration). Due to the inability of local stakeholders to provide this, it is recommended that NRM South and State Government look at managing the CERCA Program. Costs for analyses, ongoing equipment repair and calibration costs, boat transport, distribution and publication costs for report card and data management (data input, QA/QC, storage and licence costs) could be covered by State agencies and Local Partners.

Technical Partnerships

Data Management

Stakeholder consultation identified three broad data management issues that require addressing through the CERCA Framework:

1. **QA/QC**
   - Data "usefulness" is very important as data can be used to create awareness and behavioural change within the broader community to ensure that water quality is improved and protected (i.e. inspire behaviour change)
   - Quality assured and quality controlled data is essential for resource condition assessment

2. **Establishment of the database: Who will maintain the database after the termination of the project, and in the longer term?**
   - The long-term component was of upmost importance to Local Governments and Industry

3. **Data interpretation and/or analysis**
   - Required to assist with awareness and understanding (and to avoid misunderstanding raw data)
   - Data transparency and availability is important
   - Efficient and cooperative data partnerships required

It is an output requirement of CERCA that the data management component of the CERCA Framework needs to link with existing DPIW and/or DEPHA water quality data management systems. An evaluation of the available State Government water quality systems was conducted with regards to their suitability to hold CERCA data. Although DEPHA and DPIW each have a separate data management system, neither system completely satisfies the CERCA data requirements at this time.

The Hydstra Time Studio Database is a database developed for the storage and management of water quality information. The State Government does not own Hydstra and the DPIW pay an annual licence fee to use it. As a consequence of the Environment Division moving to the Department of Environment, Parks, Heritage and the Arts (DEPHA), it will no longer be able to use the Hydstra database for its data requirements (due to licensing issues). Additionally, Kisters (the company that owns Hydstra) is introducing a new database (WISKI) to replace

Hydstra in the near future. The licence for WISKI is more expensive than Hydstra and cannot be shared between Departments (i.e. two licences for DEPHA and DPIW would be needed). DEPHA has therefore decided to develop an alternative database and viewing interface (separate to Hydstra) designed for DEPHA use. DEPHA have been developing a data sharing agreement with DPIW.

DPIW is responsible for the collection and storage of ambient and/or non-regulatory freshwater data within the State. This includes data from Mineral Resources Tasmania, NRM water monitoring, Hydro Tasmania, Local Government, the Bureau of Meteorology, and in the future some groups and industries such as Forestry Tasmania and TSQAP.

DEPHA is responsible for ensuring development proposals meet appropriate environmental guidelines, providing environmental and planning policy advice, and measuring and reporting on indicators of environmental performance. DEPHA is also responsible for the collection and storage of regulatory data within the State. This includes Sewage Treatment Plant compliance data, remediation/emission monitoring data, and the Derwent Estuary Program.

DPIW has an existing data management system and the capacity to manage data collected through the CERCA Framework without additional resources. It has an existing online data viewing and retrieval interface (WIST). Although WIST is already available online, it is an evolving interface and DPIW has existing resources to develop WIST further. Its suitability for estuarine data needs to be addressed as WIST is currently geared towards freshwater data.

The DPIW Water Assessment Branch has the capacity to contribute to the CERCA Program by providing the resources needed for data management using its existing systems. This capacity includes:

- Data input
- Indefinite storage of data (including licences)
- Data sharing agreements
- QA/QC management
- Database maintenance
- Interface development.

This is a considerable contribution to the CERCA Program. DPIW may also have the capacity to make the necessary changes to the data management system (i.e. incorporating the capacity to access estuarine data through WIST). This data management system also allows organisations to retain ownership/intellectual property (IP) of the data collected by that organisation. A partnership agreement between DPIW and the CERCA Program has been developed.

DEPHA is developing a data management system and interface. It has already developed Splashback to view and retrieve data from Hydstra. This is particularly useful as it is capable of handling estuarine data (e.g. Derwent Estuary Program). Although an online interface is being developed, it is unclear when this will be available and whether there are the resources to develop this in the near future. The use of Splashback usually attracts a fee, however the Environment Division has offered to support the CERCA Program by providing Splashback and the technical support required to use the program at no cost. A partnership agreement between DEPHA and the CERCA Program could be developed if required.

Splashback has also been supplied to Local Governments for interrogating the data stored in Hydstra. The use of Splashback in the CERCA Program will be particularly beneficial as it will ensure a consistent approach to reporting and interpretation.

A system for the storage and management of macroinvertebrate diversity and abundance data for coasts and estuaries requires development. Data are currently stored on organisation specific databases and servers and are not readily accessible (except via external reports). Hosting arrangements for the storage of data would need to be negotiated with relevant organisations.

Two options that would require development include:
(a) adapt and extend the application of the DPIW AusRivas database, which was designed for freshwater macroinvertebrate data and is accessible through the Natural Values Atlas (online) or through the annual DPIW Waterways reports (pers comm. Tom Krasnicki DPIW). The DPIW AusRivas database would require adaptation to accommodate estuarine and coastal macroinvertebrate data
(b) invest in the development of the current TAFI coastal and estuarine macroinvertebrate database to improve data linkages and ease of data input and extraction.

Technical support

State Government (DEPHA, DPIW) also has the capacity and expertise to provide technical support and advice. In particular, the Environment Division of DEPHA has the capacity to develop and implement Water Quality Objectives (WQOs), which are set for a specific body of water, and they are the most stringent set of water quality guidelines that should be met to achieve all of the protected environmental values (PEVs) nominated for that body of water. At this stage, due to the lack of data, WQOs have not been set for estuaries and coastal waters in the Southern NRM Region. The insufficient amount of data available to set WQOs has been identified as an issue by State Government (DPIWE 2003). A co-ordinated approach to monitoring and reporting, including a baseline monitoring network is an integral part of this process (DPIWE 2003). It would be beneficial to both DEPHA and NRM South to develop data and information sharing agreements to improve the likelihood of WQOs being developed for coastal and estuarine waters in the Region.

Freshwater Resource Condition Assessment

The CERCA Framework has been designed to incorporate future links with freshwater programs for whole-of-catchment assessment. This includes linking with the existing assessment programs by Water Assessment (DPIW) and the Environment Division (DEPHA). It is hoped that the strategy in development by Hydro Consulting on behalf of NRM South will strengthen these linkages (Activity IWQ9NHT05: Establishing surface water quality baselines to set trigger levels for Resource Condition Targets).

Local Partnerships

Local partnerships will vary depending on the location being assessed. Five locations were assessed in the trial implementation program and these can be used as models for other locations in the future if there is stakeholder support to do so.

Local Governments

Most Local Governments have identified that it is sometimes difficult to sample in accordance with relevant guideline requirements and/or follow guidelines/recommended format for reporting (e.g. ANZECC Water Quality Guidelines 2000, see also DHHS 2005) due to a lack of resources (e.g. the lack of full time Environmental Health Officer – EHO – positions in all councils). Water quality monitoring programs can also lack long-term direction due to high staff turn-over. This can result in inconsistent data collection (sampling locations and methods) within and across municipalities.

Although recognising their responsibility for CERCA in their municipalities, Local Governments generally do not have the resources (financial or expertise) or capacity to extend their current work or maintain a CERCA Program. However, if a partnership approach is adopted, Local Governments can contribute substantially to CERCA.

Local Governments were therefore asked to assess their own capacity to be involved and most Councils suggested positive ways to support the assessment of resource condition in priority locations by:

- assisting with council/community liaison
- offering field support (for baseline monitoring program) if staff resources are available
- contributing Recreational Health, and outflow/ sewage treatment plant (STP) data
- sponsoring the analysis of water quality samples through Analytical Services Tasmania (for their approved priority location only)
- assisting CERCA to align priorities with existing local strategies and Catchment Management Plans

These recommendations are being trialled in conjunction with the Kingborough Council and being considered by the Huon Valley Council, Sorell Council, Clarence City Council and Glamorgan Spring Bay Council. The involvement of these Local Governments will directly influence the success of the CERCA Program in these municipalities.

Possible future directions to be considered could also include the centralisation of recreational monitoring in conjunction with environmental condition monitoring (i.e. CERCA) in order to introduce resource sharing opportunities between councils. Due to resource constraints, it is sometimes difficult to sample in accordance with relevant guideline requirements and/or follow guidelines/recommended format for reporting (e.g. Water Quality Guidelines, see also DHHS 2005).

Water quality monitoring programs can also lack long-term direction due to the high turn-over in employment of staff. This results in inconsistent data collection (sampling locations and methods) within and across municipalities (DHHS 2005). Pooling resources, sharing equipment and/or personnel could improve the quality and consistency of recreational and environmental water quality data across municipalities.

Community groups

The current lack of facilitation options for community groups at a Regional, State and National level is a major drawback when considering the capacity for community groups to take part in monitoring activities. There is a requirement for a long-term vision for community-based coastal management, including a system to assist the collation of community group data and to provide feedback to all groups. This will be difficult, if not impossible, without long-term/dedicated funding/facilitation. A feedback mechanism (e.g. report cards or newsletters) is equally as important as data collation itself, as this provides volunteers with ownership of the program and recognition for their work, as well as increased understanding of the results.

At this stage, community groups have limited capacity to be involved in a CERCA Program due to this lack of support. However, community groups can be involved in a number of ways, such as:

- providing field assistance where required
- providing past and ongoing Waterwatch data (subject to QA/QC protocols)

For groups wanting to start a coastal or estuarine monitoring program, it is recommended that the CERCA Program support this through training assistance and loaning equipment (if required). A community monitoring program should be based on the methods recommended in the Waterwatch National Technical Committee Manual, Module 7 – Estuarine Monitoring and Crawford (2006). A simple training manual was developed and trialled in Georges Bay (NRM North) (Crawford 2007). This could be adapted and applied elsewhere in the State if required.

In the recent past, some Australian Government support has been provided to community groups undertaking water quality monitoring in estuaries and coastal waters (e.g. advice available from NHT Facilitators, financial assistance available through Envirofund). During the development of this CERCA Framework, several Landcare, Coastcare, Friends Of, and other community organisations (e.g. Scouts, Yacht Clubs etc) expressed interest in participating in coastal and estuarine monitoring.

It was initially thought that a joint Envirofund project, managed in consultation with the Southern Coastcare Association of Tasmania (SCAT), would be a potential option for these groups. With the recent change from NHT to “Caring for our Country”, it is unclear how communities could be supported to monitor water quality. It may be possible for community groups to apply for Community Coastcare Grants through the “Caring for Country” program to undertake onground activities that aim to improve estuarine, coastal or groundwater health (e.g. erosion control, creek, coastline and riverbank repair, or pollution reduction activities) and improve community skills, knowledge and engagement. Coastal and estuarine water quality monitoring could be a component of these projects, keeping in mind that Community Coastcare applications should focus on the National priorities defined on the Coastcare fact sheet (e.g. RAMSAR sites, Nationally listed threatened species etc) and demonstrate onground achievement.

With no clear strategic support in the Region (or State), it is difficult to implement a community water quality monitoring program for coasts and estuaries. However, if the CERCA Program was managed into the future, funding could be sought if/when it became available and the Program could assist groups with QA/QC, training, data management and interpretation, and by developing community education opportunities (e.g. newsletters, report cards and open days). Components of the CERCA Program could be trialled further in conjunction with interested community groups.

A discussion paper developed by Don Thomson (Waterwatch Australia) presents some ideas for developing a community water quality monitoring framework in Tasmania (Thomson 2007). The CERCA Program would be strengthened by community participation if the recommendations of Thomson (2007) were implemented and linked with the CERCA Framework.

State Government

As well as the data sharing, agreements being negotiated with the DPIW (Water Assessment) and DEPHA (Environment Division), it is viable to negotiate field support with the Northern and Southern Parks and Wildlife Services (for locations relevant to Parks and Wildlife Service priorities e.g. Pitt Water/Orielton Lagoon and Moulting Lagoon/Great Swanport).

Salmon Industry

The Tasmanian Salmon Growers Association (TSGA) considers it essential that the salmon farming companies (and/or TSGA) be involved in the CERCA process for Port Cygnet and North West Bay (pers comm. Pheroze Jungalwalla 2007). A monitoring and assessment strategy for the salmon industry is being developed by the Aquafin CRC, CSIRO Marine and Atmospheric Research and the Tasmanian Aquaculture and Fisheries Institute (Thomson *et al.* 2007). It is recommended that data sharing agreements be reached in conjunction with the TSGA. It is important that the TSGA be recognised for their contribution. Pheroze Jungalwalla (Executive Officer) is to act as general liaison, but the farm managers are also available for more detailed information

Oyster Industry

Individual oyster farmers can be involved in the CERCA Program in a number of ways. However, since they are often on the water every day, the most beneficial involvement would be to provide field assistance and boat transport where required (e.g. Moulting Lagoon and Pitt Water).

Due to their daily presence in some of our estuaries, oyster farmers can also provide an excellent perspective on changes to the system. They can also report on local events such as floods, algal blooms or introduced marine pests.

Other Stakeholders

Other stakeholders include land owners/managers adjacent to significant priority locations (e.g. Coombend Winery, Moulting Lagoon). It is recommended that these develop farm management plans (if not already complete) and adopt a monitoring program for adjacent water(s) in conjunction with the CERCA Program. It is not expected that land managers interpret their own data, but rather data be fed back to CERCA for interpretation. Information would need to be returned to land managers in the form of updates and the Annual Report Card. Some land managers may have the capacity to sponsor the analysis of water samples from sites adjacent to their property.

As part of the trial progam (2007-2008) a proposal has been developed for the Coombend Winery, Moulting Lagoon, in conjunction with the manager, Derek Loy and the Parks and Wildlife Service. This model could be applied in other estuaries with other significant land managers if there was support to do so. In addition, a program, called the "*Coombend Project for Moulting Lagoon Protection*" is being developed on behalf of Tamar Ridge Estates. This project will include the fencing of the Moulting Lagoon foreshore from grazing and the establishment of a native vegetation buffer zone. Onground works such as this, which aim to decrease siltation and nutrient runoff into Moulting Lagoon, align with the recommendations in this CERCA framework. In addition to the proposed onground works, Coombend aims to initiate the development of annual field days to increase opportunities for community education and to provide a mechanism for monitoring results to be returned to local land managers. This proposal can provide immediate benefits, such as increased participation in the management of coastal ecosystems, increased community understanding of the connections between coastal, estuarine and catchment issues and the generation of baseline data from ongoing monitoring of the status and health of coastal ecosystems.

Chapter Three

A Supplementary Guide For
Coastal & Estuarine Resource Condition Assessment

Suitability of Condition Indicators

Background: Marine, Coastal and Estuarine Indicators

There are a number of reports available that recommend indicators and methodology for assessing coastal, estuarine and marine condition (e.g. Temby and Crawford 2008, Hirst and Kilpatrick 2007, Waterwatch Steering Committee 2006, Mount 2006, Crawford 2006, ANZECC 2000). The monitoring programs recommended in most of these reports are comprehensive, "best case scenarios", where funds and resources are not limited. This framework has identified key indicators based on their value for assessing change and condition in Tasmanian estuarine and coastal waters, the purpose of the monitoring (e.g. evaluating change, or potential change, due to development, human activity or other pressure on the system), as well as their long-term feasibility in light of resource and expertise requirements).

The selected indicators can be used to assess the condition and trends in estuarine and coastal waters, meet NRM reporting requirements in Tasmania and contribute towards developing trigger levels for estuarine condition parameters specific to Tasmania. The methodology for monitoring each indicator has been described in a report (Crawford 2006) that provides information from a user's perspective on monitoring each indicator in Tasmania. The monitoring methods were selected using indicators developed and evaluated by the Tasmanian Coastal, Estuarine and Marine Indicators Working Group (Mount 2006), which examined the Nationally-agreed estuarine, coastal and marine indicators for their suitability for monitoring the condition or representative coastal, estuarine and marine environments in Tasmania.

Whilst this document aims to provide users and managers with priorities for monitoring, there is a need for more research into the suitability and value of specific indicators and the methodology used to evaluate them. TAFI is continuing to examine the suitability of indicators through the Landscape Logic project, which will be developing water quality triggers for some estuaries in the Southern NRM Region, including Pitt Water and Little Swanport, based on relationships between water quality/quantity and indicators of river and estuarine condition (www.landscapelogic.org.au). The Landscape Logic project aims to investigate water quality responses to changes in land use and land management, and how water quality in turn affects riverine and estuarine health and function. Methodologies for setting triggers for estuarine condition developed through the Landscape Logic project will reinforce the further implementation of CERCA in the Southern NRM Region. The recommendations made here should be re-examined upon completion of the Landscape Logic project

Methodology

It is recommended the following reports be referred to when developing monitoring methodology:

- CERCA: A baseline survey in the Southern NRM Region, Tasmania (Temby and Crawford 2008)
- Users' guide for Estuarine, Coastal and Marine indicators for regional NRM monitoring (Scheltinga *et al.* 2004)
  http://nlwra.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/97/42.pdf&siteID=9&str_title=Users%20guide%20to%20estuarine,%20coastal%20and%20marine%20-%20secure.pdf
- Draft Tasmanian Estuarine, Coastal and Marine Indicators for the National Monitoring and Evaluation Framework
  http://www.environment.tas.gov.au/cm_draft_tasmanian_estuarine_coastal_marine_indicators.html
- Indicators for the Condition of Estuaries and Coastal Waters (Crawford 2006)
  http://eprints.utas.edu.au/view/authors/Crawford,_CM.html
- Waterwatch Module 7: Estuarine monitoring (Waterwatch Australia Steering Committee 2006)
  http://www.waterwatch.org.au/publications/module7/index.html

Scenarios for Assessing Resource Condition

Scenario A (Table 1) is the "best case scenario", which aims to comprehensively evaluate coastal and estuarine condition without significant funding limitations. Scenario B (Table 2) is the "bare minimum scenario", which aims to generate useful coastal and estuarine condition information with minimal funds. Although it is likely that Scenario B will be the program that is implemented in the short term, if further support is generated in the future, the addition of indicators from Scenario A to Scenario B will increase the value of the information generated.

Another option is to use in situ probes that monitor continuously – these have a high initial cost, but once equipment has been purchased, have a low ongoing cost. This equipment requires regular maintenance.

Table 1. Scenario A: A comprehensive monitoring program for the evaluation of coastal and estuarine condition.

Indicator	Influencing factors	Resources/Cost	Frequency
DO	Organic matter, stratification, photosynthesis	Low	At least monthly and after rainfall events
pH	Hydrodynamics, fertiliser runoff, acid-sulphate soil disturbance	Low	At least monthly and after rainfall events
Salinity	Flow regimes, hydrodynamics	Low	At least monthly and after rainfall events
Shoreline position	Sediments, flow regimes, hydrodynamics, climate change	Low	Annually
Dissolved nutrients	Urban, industrial or agricultural runoff	High	At least monthly and after rainfall events
Total nutrients	Urban, industrial or agricultural runoff	High	At least monthly and after rainfall events
Silica	Runoff, diatom blooms	High	At least monthly and after rainfall events
Toxicants	Urban, industrial or agricultural runoff	Very High	At least monthly and after rainfall events
Turbidity	Sediments, runoff, nutrients	Low	At least monthly and after rainfall events
Temperature	Flow, seasons, climate change	Low	At least monthly and after rainfall events
Animal/plant species	Sediments, disturbance, habitat change	High	Twice annually (Spring and Autumn)
Litter	Dumping	Low	Twice annually (Spring and Autumn)
Mass mortality	Toxicants, nutrients, hydrodynamics	Low	When occur
Algal blooms	Toxicants, nutrients, hydrodynamics	Low-High	When occur
Chlorophyll a	Nutrients, habitat disturbance	Low-High	At least monthly and after rainfall events
Pest species	Disturbance, climate change	High	Annually
Pathogens	Nutrients, runoff, hydrodynamics	High	At least monthly and after rainfall events
Habitat extent	Disturbance, hydrodynamics	High	Every 5 years

Table 2. Scenario B: The minimum of indicators required for the evaluation of coastal and estuarine condition.

Indicator	Influencing factors	Resources/Cost	Frequency
DO	Organic matter, stratification, photosynthesis	Low	At least monthly and after rainfall events
pH	Hydrodynamics, fertiliser runoff, acid-sulphate soil disturbance	Low	At least monthly and after rainfall events
Salinity	Flow regimes, hydrodynamics	Low	At least monthly and after rainfall events
Dissolved nutrients	Urban, industrial or agricultural runoff	High	At least monthly and after rainfall events
Turbidity	Sediments, runoff, nutrients	Low	At least monthly and after rainfall events
Temperature	Flow, seasons, climate change	Low	At least monthly and after rainfall events
Animal/plant species	Sediments, disturbance, habitat change	High	Once annually (Spring)
Chlorophyll a	Nutrients, habitat disturbance	Low-High	At least monthly and after rainfall events
Habitat extent	Disturbance, hydrodynamics	High	Every 5 years

It is also recommended that data be collated from other programs, where information is available. Long-term and past coastal and estuarine data is available for some indicators. For example:

- pathogen data available from TSQAP, councils and/or DHHS,
- some water quality data available from TAFI and salmonid aquaculture businesses/TSGA,
- some invasive species information available from DPIW,
- habitat extent information available from Seamap Tasmania, TAFI,
- some algal bloom/biomass data available from TSQAP,
- mass mortality database available from DEPHA, and
- salinity and temperature data available from TSQAP.

The CERCA Program Trial

Partnership Trials and Local Application

Setting up partnerships and processes for long-term monitoring is time intensive so key estuaries and coastal waters were prioritised in order of most potential for continued monitoring and stakeholder engagement. Developing and supporting partnerships is extremely important, as implementation will require cooperation amongst stakeholders.

At any one time it is unlikely that there will be sufficient resources to assess the condition of all estuaries and coastal areas in the Region. It was therefore necessary to determine which estuaries are the priority for monitoring. A number of factors were considered to determine priorities, which can be broken into three parts: (a) significance of the location, (b) practicality of monitoring, and (c) capacity for collaboration (see Temby and Crawford 2007). The considerations were quite broad and may be conflicting, reflecting the wide range of issues and potential uses of estuaries and coastal waters in the Region. In no way did this process seek to rank one location as being of more "value" than another, only as a process for considering potential locations for the initial stages of implementation (i.e. locations that have a high likelihood of successful implementation given resource constraints).

Large-scale studies, programs and/or frameworks exist for the Derwent (e.g. Green and Coughanowr 2003) and Huon (e.g. CSIRO Huon Estuary Study Team 2000, Woods *et al.* 2004) estuaries, so although they are significant locations, they were excluded from selection. The Derwent Estuary Program is ongoing and is committed to working co-operatively with the NRM South CERCA Program (pers comm. Christine Coughanowr).

Key estuaries and coastal waters were chosen to reflect a range and diversity of characteristics within these waters and their catchments. These include geomorphology, condition, usage (recreation, tourism, fishing, rafting, bushwalking, hunting, swimming), agriculture, forestry and hydro-power generation) conservation significance and municipalities (see Chapter 3). The aim was to select a representative range of coastal areas and estuaries, spread across the municipalities as much as possible. It was also crucial that estuaries and coastal waters selected for monitoring had interested, informed and committed stakeholder groups that can form linkages within an integrated monitoring program.

The locations selected as priorities to develop a model monitoring framework were:

- Port Cygnet
- North West Bay
- Pitt Water / Orielton
- Little Swanport
- Moulting Lagoon / Great Swanport

A schedule of activities was developed for each of these trial locations to implement recommendations, including information on who monitors, where and how they monitor, what parameters are monitored, the frequency of monitoring and length of time over which monitoring is to be conducted for each parameter.

Due to the uncertain future management and support of a CERCA Program only a limited number of partners were involved in the Trial, with the purpose of trailing the feasibility of concepts and potential recommendations for the framework. Partners involved in the Trial were aware that the future management of the program was uncertain. If a CERCA Program was to be implemented in the longer-term, additional partners should be involved (outlined as follows).

Port Cygnet

Six sites were monitored during the CERCA Trial at Port Cygnet (see Temby and Crawford 2008). Three of these are accessible from the shore (bridges/walkways) and therefore have the potential to be monitored safely during flood events. The remaining three sites were selected to correspond with the CSIRO HES sites in the Port (CSIRO Huon Estuary Study Team 2000). A partnership with the Port Cygnet Sailing Club (PCSC) was developed and trialled, whereby the PCSC supported the program by providing monthly transport for the Monitoring Coordinator to the three Port-based sites. The PCSC would continue this support if the program continued in the future. Also, the PCSC is interested in monitoring additional parameters (e.g. heavy metals in sediments) to examine the influence of their slipway on the system and thereby prioritise improvements to their slipway in the future.

The sampling regime trialled was:

- Monitor monthly at outgoing low tide where feasible; where not feasible, record tidal phase
- Temperature, pH, DO, salinity, and turbidity were monitored monthly at all six sites (PC1-PC6)
- Dissolved nutrients, total nutrients and chlorophyll a were monitored monthly at four of these sites (PC2, PC4, PC5 and PC6)
- Macroinvertebrates were monitored during spring at four of these sites (PC2, PC4, PC5 and PC6).

Partnerships trialled include:

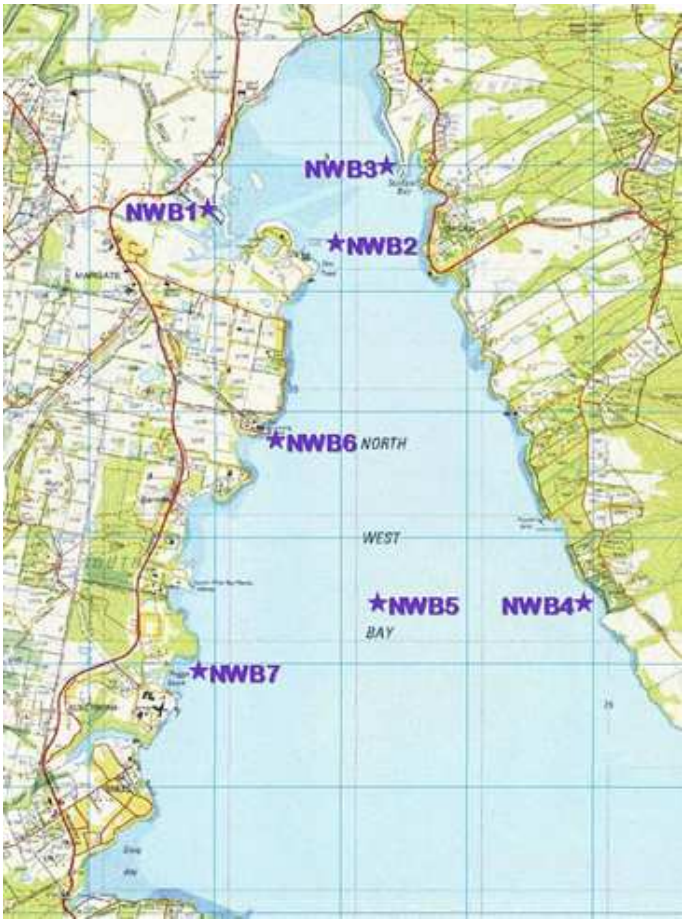
- Port Cygnet Sailing Club: Local knowledge, boat transport and field support
- TSQAP: data
- Community groups (Friends of Port Cygnet and Port Cygnet Waterwatch): data (estuarine and freshwater links), new sites, standard approach – potential for participation in joint community projects (across Region)
- DPIW (Water Assessment): Data and technical support, linkage to freshwater
- DEPHA (Environment): WQO development and technical support, linkage to freshwater

Additional roles could include:

- Huon Valley Council: data, report card publication and distribution, community support, contribute financially towards analyses
- TSGA/Huon Aquaculture: some data, possible part project sponsorship

If resources become available in the future, it is recommended that a study into sedimentation in the estuary be conducted as anecdotal evidence from the community indicates that this is a major issue. This is not feasible at this stage as the costs involved are high and the expertise to develop more appropriate methodology are not available. Habitat information (e.g. SeaMap) is not currently available for Port Cygnet. It is recommended that the feasibility of collecting this be examined.

North West Bay



Seven sites were monitored during the CERCA Trial at North West Bay, four of which correspond with the nutrient and water quality sites selected by Jordan *et al.* (2002) (Jordan *et al.*'s sites 1, 5, 6, and 7) (see Temby and Crawford 2008). A site at the mouth of the North West Bay River was also selected, as there is much community interest in the water quality and environmental flows in this river and would be a useful resource in the future. As a part of the trial, the Kingborough Council sponsored the analysis of water samples from three sites adjacent to the STP outfalls at Dru Point and Electrona as well as near the industrial premises at Barretta.

Only two sites are accessible from the shore (mouth of North West Bay River and Barretta Jetty) and therefore have the potential to be monitored during bad weather or flood events. It is therefore imperative to negotiate boat transport to the other sites. Local community groups are being asked to consider their capacity to provide transport to the sites in the estuary (NWB1-3). The Tinderbox Landcare and Coastcare Group is able to provide monthly transport to NWB4 and it may be possible for the salmon industry to provide transport to sites NWB5-NWB7. The Aquafin CRC recommended to the salmon industry that they monitor water quality at NWB5 (Thomson *et al.* 2007), so there is potential for a partnership to be developed if a CERCA Program continues.

A partnership has been developed with the Derwent Estuary Program (DEP) whereby monitoring dates are coordinated with the monitoring of the Derwent – strengthening the value of the data collected by both programs.

The sampling regime trialled was:

- Monitor monthly at outgoing low tide where feasible; where not feasible, record tidal phase
- Temperature, pH, DO, salinity, and turbidity were monitored monthly at all seven sites (NWB1-NWB7)
- Dissolved nutrients, total nutrients and chlorophyll a were monitored monthly at six of these sites (NWB1-3, NWB5-7). Three of these were sponsored by Kingborough Council.
- Macroinvertebrates were monitored during spring at four of these sites (NWB1, NWB3, NWB5, and NWB6).

Partnerships trialled include:

- TAFI: data
- Kingborough Council: data, financial contribution to analyses
- DEP: coordinate sampling dates to strengthen value of data and programs
- DPIW (Water Assessment): Data and technical support, linkage to freshwater
- DEPHA (Environment): WQO development and technical support, linkage to freshwater
- TAFI (Seamap): Habitat maps

Additional roles could include:

- Community groups (2): data (estuarine and freshwater links), new sites, standard approach, potential boat transport, liaison with local salmon industry – potential for participation in joint community projects (across Region)
- TSGA/Tassal Group Ltd: boat transport, some data
- Kingborough Council: report card publication and distribution

An update of the seagrass habitat mapping may also be achieved in the near future (Kingborough Council is investigating feasibility).

Pitt Water / Orielton

Five sites were monitored during the CERCA Trial at Pitt Water and Orielton Lagoon (see Temby and Crawford 2008). Three of these are accessible from the shore (bridges/causeway/jetty) and therefore have the potential to be monitored safely during flood events. The remaining two sites are based adjacent to Barilla Bay and Woody Island. Three of these sites correspond well with the sites examined by Crawford and Mitchell (1999).

The sampling regime trialled was:

- Monitor monthly at outgoing low tide where feasible; where not feasible, record tidal phase
- Temperature, pH, DO, salinity, and turbidity were monitored monthly at all five sites (PWO1-PWO5)
- Dissolved nutrients, total nutrients and chlorophyll a were monitored monthly at three of these sites (PWO1-3).
- Macroinvertebrates were monitored during spring at four of these sites (PWO1-3).

Partnerships trialled include:

- TSQAP: data
- DPIW (Water Assessment): Data and technical support, linkage to freshwater
- DEPHA (Environment): WQO development and technical support, linkage to freshwater
- TAFI (Seamap): Habitat maps
- SC: data

Additional roles could include:

- SC and CCC: data, report card publication and distribution, community support
- Oyster farmers: potential field support
- Community groups (several): data, new sites, standard approach, potential boat transport, links with ongoing onground works – potential for participation in joint community projects (across Region)
- PWS South: community support, potential boat transport/field support

Future partnerships could be developed with the oyster farmers of Pitt Water to negotiate the provision of monthly transport to these two sites (as successfully trialled in Port Cygnet with the PCSC). It also is recommended that an additional site be set up at Red Ochre Beach (near entrance to Pitt Water) due to community and Council interest in this site. It is possible that the Southern Beaches Land and Coastcare group would be able to provide boat transport to this new site.

Little Swanport

Little Swanport is quite unique in that baseline water quality information is available and monitoring is ongoing (e.g. TSQAP, TAFI, DPIW). Since very little (if any) additional monitoring is required, the CERCA Program should focus on the collation of information, reporting and communication. This was a part of the CERCA Trial (see Temby and Crawford 2008). The Little Swanport Catchment Extension Officer and the Glamorgan Spring Bay Council can assist with the communication of results. If additional monitoring becomes necessary, it is possible that the local oyster farmers could provide transport/field support.

Partnerships trialled include:

- TAFI: data
- TSQAP: data
- DPIW (Water Assessment): Data and technical support, linkage to freshwater

- DEPHA (Environment): WQO development and technical support, linkage to freshwater
- TAFI (Seamap): Habitat maps

Additional roles include:

- Little Swanport Catchment Extension Officer: communication, linkage to stakeholders (but this position has finished)
- Glamorgan Spring Bay Council NRM Officer: communication, linkage to stakeholders

Moulting Lagoon / Great Swanport

Six sites were monitored during the CERCA Trial at Great Swanport and Moulting Lagoon (see Temby and Crawford 2008). At least four of these are accessible from the shore (with care due to strong currents at Swanwick, and deep silt in the Lagoon itself) and therefore have the potential to be monitored safely during flood events. The remaining two sites are based adjacent to the Swan River entrance and Long Point (possible access via 4WD on Swanwick site). Three of these sites correspond well with the sites examined by Murphy *et al.* (2003).

Access to sites in Moulting Lagoon is difficult – regular boat access is not possible due to the shallow nature of the Lagoon and the presence of *Ruppia* sp. Access via the shore is also difficult due to the size of the lagoon (large distances between access points), silty sediment (dangerous in parts for wading) and sensitive habitats (e.g. Apsley Marshes). Sites can be accessed via the shore, but due care must be taken at all times.

The sampling regime trialled was:

- Monitor monthly at outgoing low tide where feasible; where not feasible, record tidal phase
- Temperature, pH, DO, salinity, and turbidity were monitored monthly at all five sites (MLAG1-MLG6)
- Dissolved nutrients, total nutrients and chlorophyll a were monitored monthly at three of these sites (MLAG1-2, MLAG4, and MLAG6).
- Macroinvertebrates were monitored during spring at four of these sites (MLAG1-2, MLAG4, and MLAG6).

Partnerships trialled include:

- Coombend: site access, program support
- PWS North: field support, financial support (equipment and/or some analyses), event monitoring
- TSQAP: data
- DPIW (Water Assessment): Data and technical support, linkage to freshwater
- DEPHA (Environment): WQO development and technical support
- TAFI (Seamap): Habitat maps

Additional roles could include:

- Coombend: additional program support by adopting a monitoring program for the site, link to promotion and/or environmental tourism
- GSB Council: data, report card publication and distribution, community support
- Oyster farmers: potential field support
- Community groups (in association with proposed GSB Council strategic WQ monitoring plan): data, new sites, standard approach, potential boat transport, links with ongoing onground works – potential for participation in joint community projects (across Region)

Future partnerships could be developed with the oyster farmers of Great Swanport to negotiate the provision of monthly transport to these two sites (as successfully trialled in Port Cygnet with the PCSC). The Glamorgan Spring Bay Council are endeavouring to implement a local strategic WQ monitoring plan, which focuses on community empowerment/education and could provide a valuable link into Regional CERCA (e.g. data contribution, communication opportunities including report card publication and distribution). The Council is also considering strategic site selection for Recreational Health monitoring program.

Program Management

Program Management Strategy

Central to the successful trial of the CERCA framework has been a program management strategy that clearly defines project scope, aims and outputs. This strategy will guide the continued development and implementation of the CERCA framework, which in turn can support the identification and delivery of NRM objectives and outcomes in the Southern Region.

The key management objective is to collect, manage and interpret resource condition information.

There are three program components related to information gathering:

- Collection of water quality data from nominated sites according to CERCA Framework and an agreed monitoring plan.
- Collation of data from external monitoring programs, such as those conducted on behalf of the aquaculture industry and local government
- Logging and maintaining data collected by the CERCA program and other sources in the HYDSTRA databases in conjunction with DPIW

Data interpretation includes the implementation of a communication strategy (see next section). The key output of this strategy is the provision of data to NRM South, Local Government, DPIW, DEPHA, industry and community groups and other interested stakeholders.

The CERCA trial has shown that the process of collecting, analysing and providing data has a number of significant outcomes that will benefit the region. At this level the information can be used for the identification of NRM targets and to assist in planning and management decisions. It will also form a core component for the monitoring and evaluation framework for the Region. The program has also supported the capacity of the community and stakeholders to participate in and/or contribute to regional strategic water quality monitoring, and take action towards achieving on-ground NRM outcomes.

The program has also managed and promoted financial, data and on-ground partnerships that have improved stakeholder cooperation. Progress has been made towards the following outcomes:

- Cooperation between the project and State Government Water Quality Management staff to implement standard Quality Assurance and Quality Control (QA/QC) protocols for community water quality monitoring across Tasmania, including implementing a coding system.
- Establishing linkages with other research activities (e.g. at TAFI) in order to contribute towards updates of the CERCA framework
- Contributing to the development of trigger levels and updates of resource condition reports (e.g. State of Environment).
- Improved communication and cooperation between community interest groups, industries, local government, the NRM region and government agencies in relation to water quality issues.
- Continued investigation of potential partnerships and funding sources (e.g. Caring for Country grants)

Further development could involve providing training and equipment for community groups interested in water quality monitoring in the focus locations.

Communication Strategy

Communication is an essential component of the CERCA Framework and its success in southern Tasmania. The aim of the CERCA Framework is to ensure ongoing commitment and support by all key stakeholders for all aspects of the program.

At this time, a formal mechanism to share (and therefore act on) coastal and estuarine information and knowledge is not available to stakeholders and managers. In addition to collecting baseline water quality data, the CERCA Framework aims to improve the exchange of information and data sharing opportunities. Sharing knowledge will improve the capacity of stakeholders to better manage coasts and estuaries. This information will provide NRM South, Caring For Our Country and other senior management (e.g. Local and State Government agencies) with which to focus and evaluate onground works, as well as plan or assess development proposals.

Another important aspect to the success of CERCA in southern Tasmania is the formal recognition of partners through media and publications. This recognition encourages the involvement of stakeholders by promoting the programs and the program partners.

Communication Strategy Action Plan

The target audience for the Communication Strategy will be the CERCA Partners (see Framework Overview, Chapter 2), managers of the coastal and estuarine environments and the general public. The key messages to communicate and the tools (e.g. written, verbal, visual) used to convey them will differ depending on the needs of the target group (see Table 3).

Table 3. Communication Strategy for a CERCA Framework in the Southern NRM Region

Target		Information requirement	Tool(s)	Frequency	Responsibility
Australian Government					
1. NHT/Caring For Our Country	←	Progress	Annual Progress Reports	Annually	Via Sponsor
2. NLWRA	←	Resource condition information	Comprehensive Report	3 Yearly	Via Sponsor
	←	Raw Data	WIST	As required	Via State Government
State Government					
1. DPIW	↔	Raw data	Email	Monthly	Project Officer
2. DEPHA					
(a) SoE	←	Resource condition information	RCA Reports (all)	Annually	Project Officer
(b) Environment	↔	Raw data (for development of WQOs)	WIST (need data sharing agreement with DPIW)	As required	Via DPIW
(c) Parks and Wildlife Services	←	Resource condition information for directing/assessing onground works	RCA Reports (all)	Annually	Project Officer
	↔	CERCA Program info / monitoring requirements	Phone/email	Initially and Monthly	Project Officer/Parks
(d) Derwent Estuary Program	↔	CERCA Program info / monitoring requirements (esp. North West Bay)	Phone/email	Annually	Project Officer/DEP
3. DHHS					
(a) TSQAP	→	CERCA receives raw data	Email	Annually	Manager, TSQAP
(b) Recreational Health	→	CERCA receives raw data???	Annual report from DHHS	Annually	Project Officer
Local Government					
1. Councils	←	Resource condition information	RCA Reports (all)	Annually	Project Officer
	↔		RCA Report Card	Annually	Local Government to distribute
	→	Raw data (Recreational Health, Sewerage Treatment, other Water Quality data)	Email	Annually	EHOs and/or NRM Officer
	←	Acknowledgement	Publications	Ongoing	Project Officer
2. LGAT	←	Project updates	Newsletter article	Annually	Project Officer
	→	Local Government facilitation	Meetings/forums	As required	LGAT NRM Facilitator

Table 3 (continued).

Target		Information requirement	Tool(s)	Frequency	Responsibility
Industry					
1. Oyster farmers	←	Resource condition information	RCA Reports (all)	Annually	Project Officer
	↔	CERCA Program info / monitoring requirements	Phone/email	Initially and Monthly	Project Officer
2. Salmon growers		TBC			
3. Key land managers	→	Water quality data	Email (raw data)	Monthly	Land Manager
	↔	CERCA Program info / monitoring requirements	Manual/handbook	Initially	Project Officer/Land Manager
	←	Acknowledgement	Publications	Ongoing	Project Officer
	←	Resource condition information	RCA Report Cards	Annually	Project Officer
Community					
1. Participating groups	←	Resource condition information	RCA Report Cards	Annually	Project Officer
	↔	CERCA Program info / monitoring requirements	Phone/email	Initially and Monthly	Project Officer/Group secretary
2. Interested groups	↔	CERCA Program info / monitoring requirements	Manual/handbook	Initially	Project Officer/Group secretary
3. Peak bodies (e.g. SCAT)	←	Project updates	Newsletter article	Annually	Project Officer
4. Broader community	←	Resource condition information	RCA Report Cards	Annually	Project Officer via Local Government
	←	Project information	Newspaper articles and brochure	As required	Project Officer via project partners
Sponsor (e.g. NRM South)	←	Progress	Reports	Quarterly	Project Officer
	↔	Budget / financial	Financial Reports / Audit	Annually	Project Officer
	←	Annual project report	Annual project report	Annually	Project Officer
	←	Expert input to RIP, works programs etc	Participation in NRM forums and program development	As required	Project Officer
	←	Resource condition information	RCA Reports (all)	Annually	Project Officer
CERCA Review Panel	←	Annual project report	Annual project report	Annually	Project Officer
	←	Resource condition information	RCA Reports (all)	Annually	Project Officer
Host		TBC			

Report Cards

Resource condition information for coasts and estuaries should be used to generate annual report cards to supply the community and other stakeholders with information on their local estuary. The aim of these report cards is to improve general understanding of water quality information, to recognise and promote local partners and to provide a link between the baseline study and any local programs that are being run in each specific estuary. The release of these report cards could be linked with the development of annual field days to increase opportunities for community education and to provide a mechanism for monitoring results to be returned to local land managers. This would provide immediate benefits, such as increased participation in the management of coastal ecosystems, increased community understanding of the connections between coastal, estuarine and catchment issues and the generation of baseline data and ongoing monitoring of the status and health of coastal ecosystems.

Sample Report Cards were developed as part of the Trial CERCA Program, but will require at least 24 months baseline data before being distributed.

Chapter Four

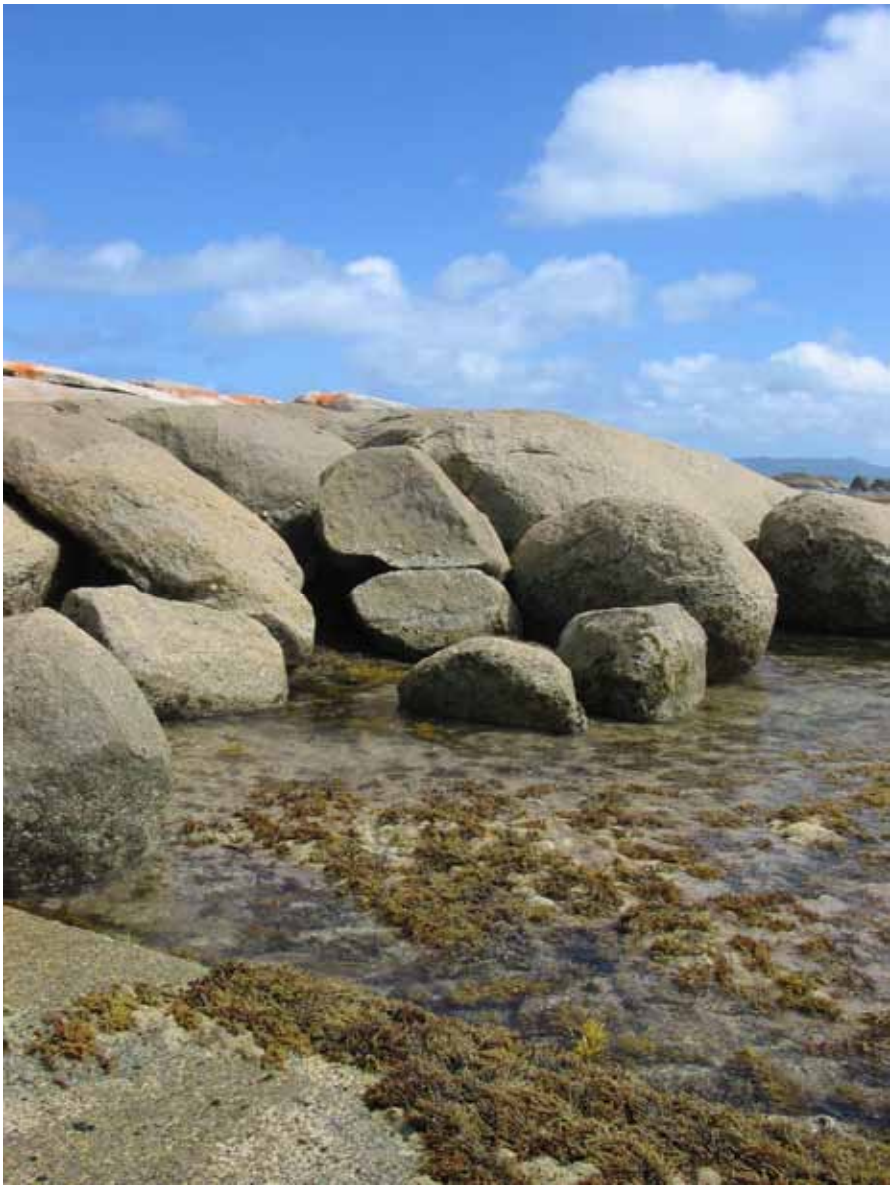
Challenges and Recommendations: Coastal & Estuarine Resource Condition Assessment

Conclusions and Recommendations

The following conclusions and recommendations are based on extensive stakeholder consultation and field testing of the CERCA framework.

A broad range of stakeholders (government, industry and community) have indicated that more information of coastal and estuarine resource condition is needed, and that implementation of the CERCA framework can provide that information. The successful trial of the framework has yielded useful baseline data that can form the basis of an ongoing condition assessment program.

The principal challenges for the further implementation of CERCA include the need for resources and program management (coordination/ facilitation). These challenges are recognised by stakeholders, but the responsibility for addressing them is less clear. A partnership approach is required. This means stakeholders will have to contribute to the program. The trial has shown that, with a minimum level of investment, the program can continue to provide valuable resource condition data. The trial has also shown that stakeholder cooperation can significantly reduce the resources required to run the program.



Future Challenges

Estuaries and coastal waters are extremely complex systems that are poorly understood in the Southern NRM Region. There are three main challenges to overcome for effective Coastal and Estuarine Resource Condition Assessment in the Southern NRM Region. These are:

1. A lack of quality data,
2. A lack of resources (financial, personnel), and
3. A gap in governance (support/management/facilitation)

Inadequate data

While the CERCA framework trial yielded valuable data, it is by no means comprehensive enough to satisfy the needs of all stakeholders. The Tasmania Monitoring and Evaluation Trial (NLWRA 2005) identified gaps in data and requirements for new data collection for the natural resource condition targets contained in the Draft NRM Strategy for Southern Tasmania – including estuarine and coastal ecosystems. The main estuarine and coastal water quality issues identified through this process were that: (a) long-term trends in water quality are poorly understood due to a lack of broad-scale monitoring and ongoing data collection (especially ecological indicators); and (b) nutrients, turbidity and salinity of estuaries of critical and high conservation significance are poorly understood. The NLWRA (2005) recommended that an ongoing systematic monitoring program is required, including more robust baseline monitoring of nutrients, turbidity and salinity. The NLWRA (2005) also identified issues with regard to monitoring (e.g. no ongoing funding program), evaluation (e.g. variable methodologies applied in projects) and other gaps (e.g. data requiring updating, limited geographical coverage).

The deficiency in regular and consistent monitoring of coastal, marine and estuarine environments means that it is difficult to assess the impact (both positive and negative) of activities within these environments and their catchments. Without the knowledge that such monitoring generates, it is difficult for managers and stakeholders to make resource-efficient management decisions. There is a need for more information on the baseline condition for water quality and improved monitoring of reference sites (e.g. pristine/near pristine waters). An approach to monitoring needs to be standardised across locations, and the levels of data “quality” need to be assured. It is also important that the trigger levels for determining unacceptable levels of impact continue to be developed and communicated.

It is important to remember that a baseline or benchmark of resource condition is required as a starting point against which changes in condition can be evaluated. Unfortunately, this information is generally not available for most estuaries and marine waters in Tasmania. Most estuaries in Tasmania have significant activity occurring in their catchments, and a number of estuaries are already obviously degraded and no data exist on their pristine condition, making it impossible to quantify the changes that have already occurred. Thus today’s condition has to be the benchmark for assessing change in the future (sliding baseline syndrome). However, if we keep in mind natural variability between (and within) estuaries, we can sometimes make comparisons between relatively undisturbed estuaries (‘reference estuaries’) and those that have been modified as a means of evaluating the current condition of an estuary.

As a consequence, the first task in assessing the condition of estuaries will be to establish a comprehensive benchmark dataset. Future monitoring may not necessarily remeasure all variables from the benchmark dataset as monitoring programs are improved and refined, but it is very important to have a comprehensive baseline so that a variety of comparisons can be made as required in the future.

The insufficient amount of data available to set WQOs has been identified as an issue by State Government (DPIWE 2003). A co-ordinated approach to monitoring and reporting, including a baseline monitoring network is an integral part of this process (DPIWE 2003).

At any one time it is unlikely that there will be sufficient resources to monitor all waters in the Region. It is therefore necessary to determine which estuaries and coastal waters are the priority for monitoring.

Criteria for determining priority monitoring sites include: (a) significance of the location, (b) practicality of monitoring, and (c) capacity for

collaboration. These considerations are quite broad and may be conflicting, reflecting the wide range of issues and potential uses of estuaries and coastal waters in the Region.

In no way should this process be seen to rank one location as being of more "value" than another, only as a process for considering potential locations for of implementation (i.e. locations that have a high likelihood of successful implementation given resource constraints).

It is preferable that the monitored estuaries are spread geographically throughout the NRM South Region so all representative areas of the Region are included in a monitoring program. It is also crucial that estuaries and coastal waters selected for monitoring have interested, informed and committed stakeholder groups that can form linkages within an integrated monitoring program. Other aspects that have been considered to determine priorities include the relevance/significance to community groups/government/industry and the level of threat or degradation to the ecosystem.

Although these criteria form the basis for prioritisation, circumstances may change if an area has been subject to a significant event (e.g. an oil spill is a catastrophic event that could make a perceived low priority site a higher priority). In these circumstances, monitoring will be required to determine initial impact and whether recovery / rehabilitation has occurred. More research is needed to prioritise condition indicators according to cost and effectiveness for resource condition assessment, develop rapid assessment tools for estuaries and into trigger levels and management response/actions.

The trial of the CERCA framework (2007-2008) has demonstrated that the collection and collation of baseline water quality data is feasible and worthwhile (see Temby and Crawford 2008).

Limited resources

A lack of resources is the main deficiency in the collection and management of resource condition information in Tasmania, and this problem spans across programs. The NRM South CERCA project aims to address these issues by developing and implementing an integrated resource condition monitoring framework for estuaries including:

- A co-ordinated and strategic system for monitoring and reporting
- A long-term framework/plan (including finance requirements and funding options)
- An implementation strategy
- Partnership agreements or Memoranda of Understanding to facilitate co-ordination between programs and optimise funding, equipment and personnel
- A system for data management (e.g. centralised, versatile database)
- A mechanism for data distribution and reporting (e.g. report cards)

This program will provide a guide for regional investment and it is therefore important that marine and coastal stakeholders are involved in the planning of priorities and management targets.

It is sometimes difficult to sample in accordance with relevant guideline requirements and/or follow guidelines/recommended format for reporting (e.g. Water Quality Guidelines, see also DHHS 2005) due to a lack of resources (e.g. the lack of full-time Environmental Health Officer – EHO – positions in all councils). Resource condition monitoring programs can also lack long-term direction due to the high turn-over in employment of staff. This results in inconsistent data collection (sampling locations and methods) within and across municipalities.

To assess coastal and estuarine resource condition, we need long term quality assured data. However, long term monitoring programs do not readily fit into the short term financial plans of most stakeholders and management organisations. This presents a major problem when trying to implement a program.

Gap in governance

These problems highlight the need for guidance of resource condition monitoring activities through a framework, partnership agreements and facilitation. For example, there is potential for co-operation between TSQAP and Local Government recreational monitoring due to the Public Health requirements for councils and the long-term monitoring conducted by TSQAP close to high recreation areas (e.g. an *E. coli* correlation with rainfall and salinity – TSQAP have developed a correlation between rainfall, salinity and faecal coliform in water and use rainfall and salinity levels as a "trigger" for harvest closure – trigger levels vary across estuaries).

Community groups are often proposed as suitable organisations to "fill the gaps" in monitoring frameworks, with numerous added benefits suggested for their involvement. These include the legitimisation of planning outcomes, a reduction in community alienation, avoidance of conflict, making legislation more meaningful and respected, building support for agency programs, tapping into local knowledge, providing feedback on program outcomes, contributing to community education and enhancing democratic processes by increasing government accountability (Curtis and Lockwood 2000). However, public participation is often criticised as being costly, time consuming, and with no guarantee of success (Bettini 2002). The role and capacity of communities involved in Coastcare is contentious (Clarke 2002) due to issues such as limited resources and quality control of data. An example of these limitations is that the concentrations of nitrate and phosphate in estuarine waters can be below the detection limit of sampling equipment commonly used by community groups (Murphy *et al.* 2003). Also, there has been a perceived breakdown in institutional support of such programs, which has often been identified as a critical factor for success (Clarke 2002, Curtis and Lockwood 2000).

The NHT/Caring For Our Country, through programs such as Landcare, Coastcare and Waterwatch, has provided a framework for participation by engaging community and government towards agreed coastal management initiatives (Clarke 2002). The key to success has been establishing a support network through robust interagency-community partnerships and benefit-based cost sharing mechanisms (Curtis and Lockwood 2000). That is, community groups often require assistance from a facilitator with a shared sense of purpose, whereby groups have a nominated contact and maintain regular contact with that person and receive newsletters etc regarding workshops and conferences. Inconsistency in government support for facilitation has resulted in declining community participation in water quality monitoring. There is an urgent need to provide facilitator support, and in southern Tasmania, this role could be facilitated by NRM South, Councils, State Government and independent volunteer organisations such as the Southern Coastcare Association of Tasmania Inc. (SCAT).

The current lack of facilitation options for community groups is a major drawback when considering the capacity for community groups to take part in monitoring activities. There is a requirement for a long-term vision for community-based coastal management because, without it there is the likelihood that short-term funding rounds will influence the type of activity that local communities undertake (Clarke 2002). A system to assist the collation of community group data and provide feedback to all groups is also required, but without long-term/dedicated funding/facilitation, this will be difficult. A feedback mechanism (e.g. through report cards or newsletters) is equally as important as data collation itself, as this provides volunteers with ownership of the program and recognition for their work and increased understanding of the results.

Summary of Recommendations

The following recommendations for the development and implementation of the CERCA Framework have been carefully considered after comprehensive discussions with a wide range of stakeholders, and consideration of the future data needs of the region.

1. **A CERCA Program – involving the collection of Quality Assured / Quality Controlled (QA/QC) data in priority coastal and estuarine locations – continues to be implemented and managed across the Region (if not the State).**

2. **A partnership approach is used to deliver CERCA implementation.**
   - **Stakeholder beneficiaries contribute to the project, financially and/or through in-kind contributions;**
   - **State government contributes through data management and consider hosting a program manger/facilitator for the state;**
   - **NRM contributes financially to program management;**
   - **Investment continues to build stakeholder capacity to effectively contribute to the program by providing support, advice and/or training and equipment.**

3. **A Project Officer coordinates and facilitates the partnerships, collects/collates and processes data, and provides analysis in a variety of formats suitable for stakeholders.**

4. **Communication between managers (e.g. NRM South, Local Government, industry etc) be maintained and resource condition information be supplied in a meaningful way.**

5. **The CERCA Framework continues to be reviewed.**

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